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(54) **ADDRESS LEARNING SYSTEM FOR SWITCHING HUB**

(57) Abstract:

PROBLEM TO BE SOLVED: To reduce the access frequency to a CAM by adopting the configuration not making a retrieval for learning an address when a frame is received from a port to which only one terminal is connected so as to relieve the load of a CPU.

SOLUTION: Plural terminals are connected to a port 1 of a switching hub 11a and a plural terminal connection flag is set to TRUE. Only a single terminal connects respectively to ports 2, 3. The plural terminal connection flag is set to FALSE. When the plural terminal connection flag is set to FALSE, it is discriminated that only one connection terminal is connected to the concerned port. In this case, an address this time is compared with a precedingly received address only without retrieving an address discrimination circuit memory (CAM) for learning the address to only check whether or not another connection terminal is replaced. Since the software operating time is required in a CPU and it is not required to access a memory such as the CAM whose operating speed is slow, the processing time of the CPU is reduced.

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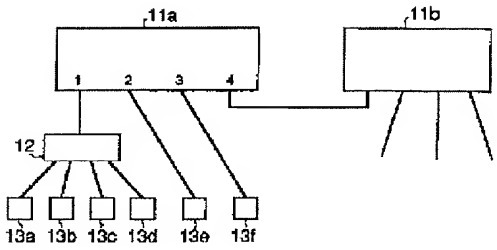

(Reference 3)
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Patent Application No. H7-217179
Application Date: August 25, 1995
Applicant: Hitachi Densen K.K.

Detailed Description of the Invention:
【0001】
Field of the Invention :

The present invention relates to a terminal address learning system in a switching hub, and particularly to a terminal address learning system of a switching hub having a high-performance, the switching hub being able to handle a lot of frames while minimizing the number of missing frames.
【0002】

In a local-area network (LAN) such as Ethernet, a plurality of terminals have a media in common, and therefore the terminals cannot transmit signals at the same time. There is, therefore, a problem that, when the number of terminals connected to the LAN increases, the bandwidth available for each terminal decreases. In order to solve the problem, a switching hub having high performance at low cost is developed; the switching hub can handle a plurality of communication simultaneously, and accordingly the whole bandwidth can be multiplied integrally.
【0003】

Fig. 3 shows one example of a network structure using switching hubs 11a, 11b ···. The switching hub 11a has four network ports (Ports 1-4), and can perform two communications simultaneously, for example, Port 1 to Port 2 and Port 3 to Port 4. Terminals 13a to 13d are connected to Port 1 via a repeating hub 12, and Port 13e and Port 13f are connected to Port 2 and Port 3, respectively. The four terminals 13a to 13d are connected to Port 1 via the repeating hub 12,and consequently these four terminals have the sole LAN in common, as a result only one terminal is permitted to transmit signals while the other terminals are not permitted to do so. In contrast, Port 2 or 3 has one terminal connected thereto, and therefore, their terminals are permitted to communicate all the time. A terminal which requires a quick communication is connected to terminal 13e or 13f, and

connected to Port 2 or 3. Such a connection helps the whole system significantly improve its throughput. Also, the whole system can be extended by connecting another switching hub 11b to Port 4.

【0004】

Fig. 4 shows one example of the hardware structure of the switching hub. There are a variety of structures to adapt different switching systems. The structure of Fig. 4 is designed for a software type switching system, and can be made easily. As shown in Fig. 4, a CPU 21, a buffer memory 22, network interfaces 23a to 23d associated with Ports 1 to 4, and an address identifying memory 24 comprising a CAM (Content Address Memory) which is also called "Address Registration Table", are connected together to a common bus 25. The CAM is a memory which can conduct many address comparison at the same time, and is used in the address identifying memory 24 to determine to which transfer port a given transmission frame is directed from the destination address retrieved from the frame.

【0005】

Fig. 5 shows a transmission frame traveling in the network. The transmission frame 31 is composed of : a destination address 32 indicating the receiving end of the transmission frame; an origination address 33 indicating the sending end of the transmission frame; information data 34 and an error check 35 to detect errors in communication if any.

【0006】

Fig. 6 shows one example of the registration of the address identifying memory 24 comprising a CAM (Address Registration Table). As shown in the table, the port number column has the numbers (1 to 4) of the ports in the network, each port number being laterally aligned with the relevant terminal 13a, 13b, 13c, 13d, 13e or 13f, which is registered in the connection terminal address column. The registration corresponds to the network structure of Fig.3.

【0007】

Referring to Figs. 3-6, the function of the switching hub will be described. When the switching hub (Fig.4) receives a transmission frame, it is tentatively stored in the buffer memory 22. Then, the CPU 21 confirms that the received transmission frame is an error-free, normal frame, compares the destination address 32 with the content of the address identifying memory 24, and determines to which port the received

transmission frame is transferred. For example, if the destination address of the transmission frame received at Port 1 is found to be 13e, then the destination address 13e is searched in the address identifying memory 24. As a result, the address 13e is found to be connected to Port 2, and it is determined that the transmission frame should be transferred to Port 2.

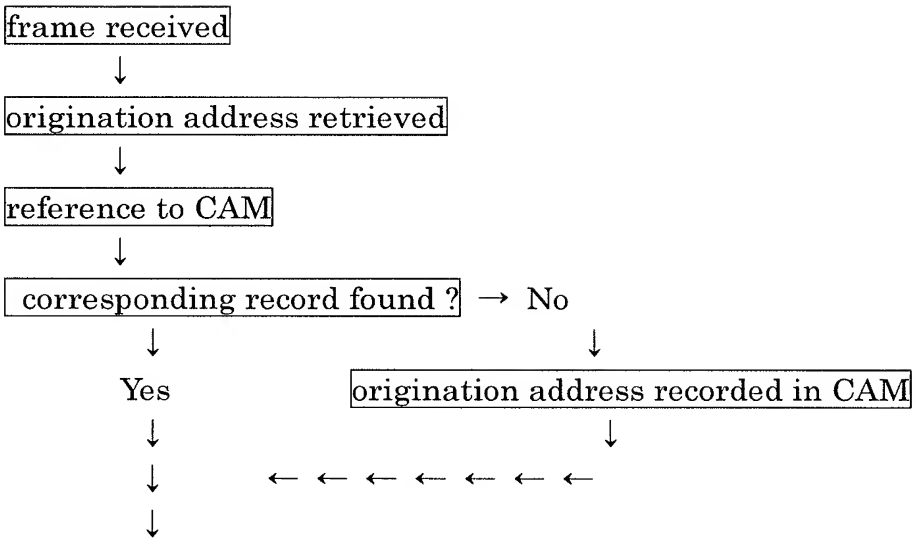
【0008】

The arrangement for connecting a plurality of terminals to the switching hub as shown in Fig. 3 may be structurally changed and enlarged. Then, the content registered in the CAM will not correspond to the correct address. To reduce the incorrect registration caused thereby, a lot of the switching hubs have a learning function. The address learning function is to read the origination address (sending end address) from the received frame, to determine the address of the terminal to which the frame-receiving port is connected, and store the address of the terminal in the address identifying memory 24. Thus, even if the network structure is modified, address of each terminal connected to the port can be identified.

【0009】

Fig. 7 shows how the address is learned at the time of receiving a transmission frame. After the transmission frame is received, the origination address is retrieved from the received frame. Then, it is determined as to whether or not the retrieved origination address has been already registered in the registration table of Fig.6. If the origination address is already registered, no proceeding is required. If not, the origination address is registered.

Fig.7


frame received
origination address retrieved
reference to CAM
corresponding record found ?
No
Yes
origination address recorded in CAM